## Document Log Item

| Addressing | |
|---|---|
| **From** | **To** |
| Adam Freedman/R9/USEPA/US | "Chan, Victor M." <VMChan@SolanoCounty.com> |
| **CC** | **BCC** |
| David Albright/R9/USEPA/US@EPA<br>George Robin/R9/USEPA/US@EPA<br>"Leland, James H." <JHLeland@SolanoCounty.com><br>"Geisert, Matthew" <MGeisert@solanocounty.com><br>"Kaltreider, Misty C." <MKaltreider@solanocounty.com><br>"Ferrario, Nedzlene N."<br><NNFerrario@SolanoCounty.com><br>"Serrano, Ricardo" <RSerrano@SolanoCounty.com><br>"Schmidtbauer, Terry"<br><TSchmidtbauer@SolanoCounty.com> | |

| Description | | | Form Used: Reply |
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| **Subject** | | **Date/Time** | |
| RE: Blow-Out Prevention Permit Language | | 02/02/2010 02:06 PM | |
| **# of Attachments** | **Total Bytes** | **NPM** | **Contributor** |
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Body

## Document Body

Victor and Ned,
I appreciate the thorough nature of your review and the concerns you have expressed with regard to sound engineering and the protection of public health. To respond to a few of your queries:

While the engineering practices and designs proposed by Shell for their CO2 injection do in large part inform the final construction specifications, EPA's permit requirements are not wholly dependent on Shell's proposals. As we discussed at our meeting in Fairfield last week, EPA conducts a review of and must approve all drilling, construction and injection proposals before any Permittee is authorized to proceed. This review is conducted by experts within the Region, and if necessary, by national experts within the Agency. In addition, while Shell has proposed a rigorous testing and monitoring program, EPA will require Shell to conduct any additional testing that we deem necessary to confirm that the well is properly constructed and that the injection and confining zones are of the appropriate geology. Also, as we have mentioned in previous meetings, while the injection of CO2 for long-term sequestration is a fairly new concept within the realm of existing technology, the oil and gas industry has been injecting CO2 for enhanced oil recovery for over 30 years. Further, Shell's proposed project is a small-scale research pilot solely for the purpose of gathering data.

I would also like to address your concerns about a major failure (i.e. massive, instantaneous release of all injected CO2), as this is a point on which you have been focused (with good reason) throughout the process. Beyond the fact that there has not been a "major failure" in the past 30+ years of commercial-scale CO2 injection for enhanced recovery, a large-scale failure like the one that you discuss is simply not possible in this instance. The volume of CO2 is exceedingly small relative to current and proposed CO2 sequestration projects. Moreover, a large-scale failure similar to the oft-referenced Lake Nyos release is also impossible, as the earth's crust overlying the injection zone simply cannot turn over in the same manner as a fluid lake. Based on our review of the geologic logs in the permit application, there are numerous confining layers between the injection formation (at an expected depth of 10,000+ feet) and the surface, including directly above the injection zone, thereby reducing the likelihood of CO2 release to zero. Also, while EPA's regulations and standards for geologic sequestration have yet to be finalized, we do have established, effective methods for detecting varying and progressive signs of failure and dealing with them. For example, continuous pressure and temperature monitoring in and above the injection zone can immediately detect the loss of the external aspect of the well's mechanical integrity (movement of CO2 out of the target injection formation), while other advanced monitoring techniques can track the movement of injected CO2 in the subsurface. In short, the standards to be applied in this instance actually exceed sufficient and appropriate standards for regulating this Class V-Experimental well.

I am interested to hear what kind of language you would propose to include in an MOU. I don't believe that Solano County and EPA would need an MOU for Solano to be able to require in their own permit that certain EPA conditions be followed. We certainly find it appealing to

streamline the process in any way possible, and would be interested to hear more about the purpose and specific contents of an MOU. If you could elaborate upon that, we would very much appreciate it.

If you have any questions about the issues raised in this message, or any other question about the project, please feel free to be in touch.

Adam Freedman
Environmental Scientist, Underground Injection Control
U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street (WTR-9)
San Francisco, CA 94105-3901
415.972.3845
freedman.adam@epa.gov

"Chan, Victor M." ---02/01/2010 09:35:30 AM---Adam

From: "Chan, Victor M." <VMChan@SolanoCounty.com>
To: Adam Freedman/R9/USEPA/US@EPA, "Ferrario, Nedzlene N." <NNFerrario@SolanoCounty.com>, "Leland, James H." <JHLeland@SolanoCounty.com>
Cc: David Albright/R9/USEPA/US@EPA, George Robin/R9/USEPA/US@EPA, "Kaltreider, Misty C." <MKaltreider@solanocounty.com>, "Serrano, Ricardo" <RSerrano@SolanoCounty.com>, "Schmidtbauer, Terry" <TSchmidtbauer@SolanoCounty.com>, "Geisert, Matthew" <MGeisert@solanocounty.com>
Date: 02/01/2010 09:35 AM
Subject: RE: Blow-Out Prevention Permit Language

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Adam

Since I was an ex-nuclear engineer, you should be aware that failure of a complex engineered system involves:

(1) Failure in design – An independent QA design review is normally conducted to ensure every part is designed to meet the pressure requirements with the appropriate design safety factor.
(2) Failure in material procurement – A certification program is sometimes needed to ensure the material meets design specs. This will avoid using substandard material that does not meet design reqm'ts.
(3) Failure in installation or workmanship – This becomes important if on-site welding or poor construction procedure is performed on concrete without proper QA inspection.

Based on the language of your permit, the US EPA is wholly dependent on the best engineering practices of Shell Oil on CO2 injection. This is normal practice when you don't have a past major failure.

However, when a major failure does occur, a failure analysis will determine which of the three failures is involved and then develop standards to prevent the failure from happening again. Standards are already in place for the nuclear engineering industry, commercial airline industry and NASA because major failures have occurred. However, I don't see similar standards are in place in CO2 injection simply because we have yet to have a major failure. Another example: Toyota accelerator problem is likely a design failure rather than (2) and (3) and therefore a design modification will be required.

Hence, we have a major decision to make. Are the current standards for CO2 injection sufficient?

Bottomline: If the US EPA willing to sign an MOU with Solano County stating that the current standards and industry practices are sufficient, then this will streamline the Use Permit process at Solano County.

Victor M Chan, PE, BCEE
Solano County Environmental Engineer www.aaee.net
707-784-3177

**From:** Freedman.Adam@epamail.epa.gov [mailto:Freedman.Adam@epamail.epa.gov]

**Sent:** Friday, January 29, 2010 5:02 PM

**To:** Chan, Victor M.; Ferrario, Nedzlene N.

**Cc:** Albright.David@epamail.epa.gov; Robin.George@epamail.epa.gov

**Subject:** Blow-Out Prevention Permit Language

Victor and Ned,
I wanted to show you how our current permit language addresses blow-out prevention (BOP), as I noted that your information request of Shell includes specifics pertaining to their BOP design. The language is draft and submit to change during our permit writing process.

1. Drilling, Work-over, and Plugging Procedures

**Drilling, work-over, and plugging procedures must comply with the CDOGGR "Onshore Well Regulations" of the California Code of Regulations, found in Title 14, Natural Resources, Division 2, Department of Conservation, Chapter 4, Article 3, Section 1722-1723. Drilling procedures shall also include the following:**

(a) Details for staging long-string cementing or justification for cementing without staging;

(b) Records of daily Drilling Reports (electronic and hard copies);

**(c) Blowout Preventer (BOP) System testing on recorder charts including complete explanatory notes during the test(s),**

(d) Casing and other tubular and accessory measurement tallies; and

(e) Details and justification for any open hole gravel packing.

The "Onshore Well Regulations" that we cite in our permit may be found at ftp://ftp.consrv.ca.gov/pub/oil/regulations/PRC04.PDF -- and the applicable language is on page 29, with specific guidances on design found in DOGGR publication No. MO 7, as noted below.

**1722.5. Blowout Prevention and Related Well Control Equipment.**

Blowout prevention and related well control equipment shall be installed, tested, used, and maintained in a manner necessary to prevent an uncontrolled flow of fluid from a well. Division of Oil, Gas, and Geothermal Resources publication No. MO 7, "Blowout Prevention in California," shall be used by Division personnel as a guide in establishing the blowout prevention equipment requirements specified in the Division's approval of proposed operations.

Please let me know if you have any further questions and I would be happy to discuss them.

Adam Freedman
Environmental Scientist, Underground Injection Control
U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street (WTR-9)
San Francisco, CA 94105-3901
415.972.3845
freedman.adam@epa.gov